

CHANGES IN THE COLORATION OF *ATRACTOMORPHA SIMILIS* I. BOLIVAR (ORTHOPTERA: PYRGOMORPHIDAE)

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Introduction

The colour of the hind wing of the grasshopper *Atractomorpha similis* I. Bolívar varies from colourless to deep pink, and Rehn (1953) suggested that the variation might be due to some environmental factor or 'to physiological factors in the ontogeny of the individual'. During a brief stay in Queensland in September 1972 some observations were made on this species which indicate that his second supposition is the correct one.

Observations

Specimens of *A. similis* were collected in the final nymphal instar at various localities in and around Brisbane. As they moulted to adult they were isolated in containers and kept at room temperature which was in the range 25-30°C for most of the day. The insects were fed mainly on *Rumex* with the addition of *Ageratum* and *Tropaelom* (garden nasturtium), and their colour was recorded daily. Most of the insects were bright green, and these were chosen for observations on colour change.

The hind wings of newly emerged insects of both sexes were quite colourless (Stage I, Fig. 1a), but after a time the proximal ends of the longitudinal veins of the anal area became pink (Stage II, Fig. 1b). The pink colour then spread to the cross veins and the wing membrane in between them (Stage III, Fig. 1c), extending slowly outwards towards the margin of the hind wing until virtually the whole of the anal area was pink (Stages IV and V, Fig. 1d and 1e).

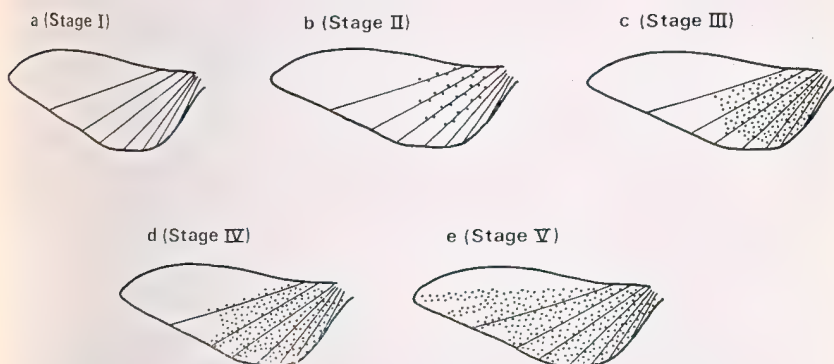


Fig. 1. Stages in the development of the wing colour. Stippled regions indicate pink colouring.

Under the conditions in which the insects were maintained, the first indication of pink appeared on the hind wings two days after ecdysis (Fig. 2). Some females reached stage IV six days after ecdysis and all the insects were in stages IV or V by day 13. After this initial fairly rapid coloration no further change occurred and the wings remained pink until the insects died after 30-40 days.

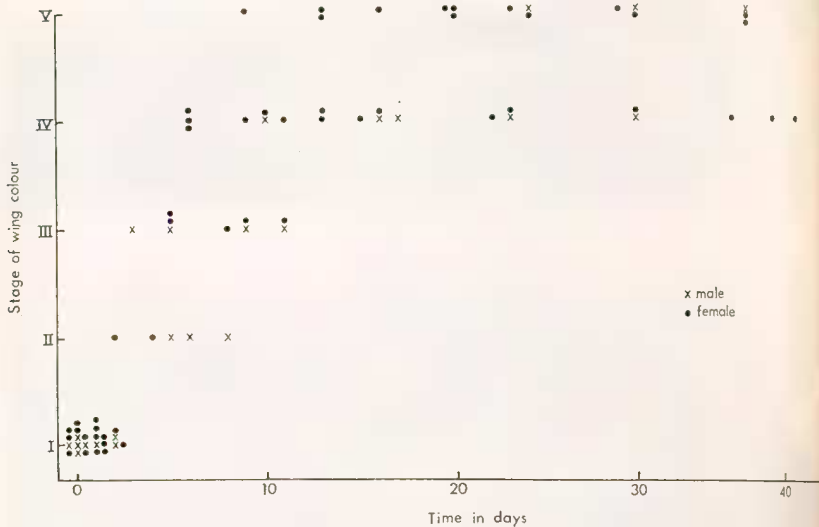


Fig. 2. The relationship between the stage of wing colour and the time since the moult to the adult stage.

The changes in wing colour were associated with changes in the abdominal coloration. In newly emerged insects the abdomen was pale green dorsally with the first three segments almost white. As the wings became coloured, the abdomen also changed, at first to orange-brown and then to pink dorsally. At an intermediate state, segments 1 and 2 were rose coloured, segments 3-6 were red-brown on their posterior margins and segments 7 and 8 were pale orange-brown posteriorly. In all the insects with hind wings in stages IV and V, abdominal segments 1-8 were pink to red-brown, but, unlike the colouring on the wings, the colour appeared to intensify with age and in a number of old insects with tattered wings collected in November, abdominal segments 1-8 and the metanotum were dark magenta.

Similar colour changes occurred in the brown variety of *A. similis* but they were obscured by the darker background colour.

Insects with wing colour in stages III and IV were seen in copula and dissections were carried out on females freshly caught in the field to determine the degree of development of the oocytes. The insects with uncoloured wings contained undeveloped oocytes, but by the time the

wings were in stage IV most insects contained well-developed oocytes (Table I). Some females with wings in stages IV and V contained fully-developed oocytes.

TABLE I

The relationship between the stage of wing coloration and oocyte development in females of *A. similis*.

Wing colour	Number of insects examined	% with developing oocytes
I	5	0
II	7	29
III	8	37
IV	10	60
V	11	91

Discussion

The changes in colour are associated with sexual maturation, but the intensification of the abdominal colour continues after maturation. Richards and Waloff (1954) describe a comparable but less extensive reddening of the abdomen associated with maturation in *Chorthippus brunneus* (Thunb.) and *Stenobothrus lineatus* (Panz.). More extensive reddening, similar to that in *A. similis*, occurs in *Omocestus ventralis* (Zett.) and *Chorithippus vagans* (Eversm.), but in these species the colour develops before sexual maturity.

Nomadacris sptemfasciata (Serville) develops a red coloration of the hind wing similar to *A. similis*, but in this case the colour appears long before sexual maturity is attained (Faure, 1935). On the other hand, Burt and Uvarov (1944) believed the development of a dark patch on the hind wings of *Mesopsis laticornis* Krauss to be associated with maturation, although they had no direct evidence.

The significance of these changes in colour is not known.

References

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